SEDIMENTATION RESEARCH

From field
To laboratory
To control

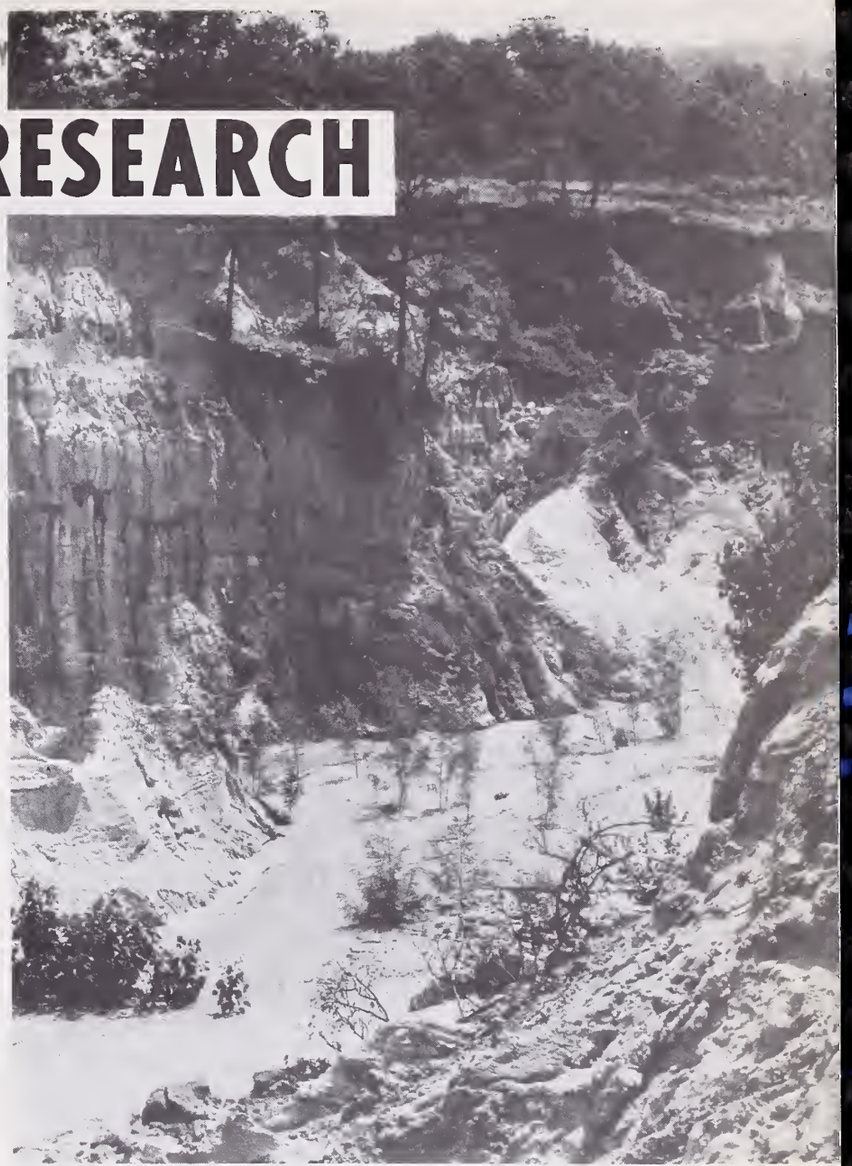
Once clear waters of streams, lakes, and reservoirs are choked and filled with silt; fertile valleys are robbed of plant nutrients.. others are covered by deposits of sterile sand and gravel; roadbeds and highways are damaged; homes, gardens, streets and entire communities are devastated by sand and silt from floodwaters. These are examples of the problem of SEDIMENTATION which now costs the Nation more than $200 million a year.

The new USDA Sedimentation Research Laboratory at Oxford, Miss.--the most modern facility of its kind in this country--is now attacking sedimentation problems from field to laboratory to control. Basic knowledge gained here will be applied to conserve water and fertility of land. Both are essential to keeping the Nation supplied with the food, fiber, and timber it needs.

The Oxford laboratory is part of Agricultural Research Service's comprehensive soil and water research program. It serves as the national center for sedimentation research. The laboratory was established in the Yazoo River basin area in Mississippi because of the critical erosion and sedimentation conditions found there. The University of Mississippi and Mississippi State University are cooperating in studies to develop better sedimentation control for the area.

The basic research laboratories are: (1) the hydraulic laboratory which features two model flumes or water channels. The larger flume is 100 feet long, 4 feet wide, and 2 feet deep. Its slope can be regulated to duplicate the slope of local streams. Up to 8,000 gallons of water-sediment mixture a minute can be circulated through the flume; (2) a sediment analysis laboratory for analyzing sediment and soil samples obtained in the field and in the laboratory; (3) a radiological laboratory equipped with the most modern electronic devices for developing advanced techniques in sedimentation research, including use of radioisotopes and ultrasonics.

The Oxford facilities provide the first opportunity for ARS scientists and engineers to study sedimentation under combined laboratory and watershed conditions. The hill portion of the Yazoo River basin extends over some 6,500 square miles in Mississippi. The area includes the Pigeon Roost Creek watershed about 30 miles north of the laboratory, which covers 117 square miles. Laboratory Creek which flows adjacent to the Sedimentation Laboratory provides 1,000 acres of drainage area.



Sediment source. Network of gullies eroded in the bluffs of the Yazoo basin in Mississippi, part of the area under study by the USDA Sedimentation Laboratory at Oxford. BN-15346X

Sand-bed channels like this are common in many parts of the country. These channels may fill with sand and silt to the point that even small rains cause streams to spill over their banks. In time, infertile sediment forces adjoining fields out of production. N-32,183

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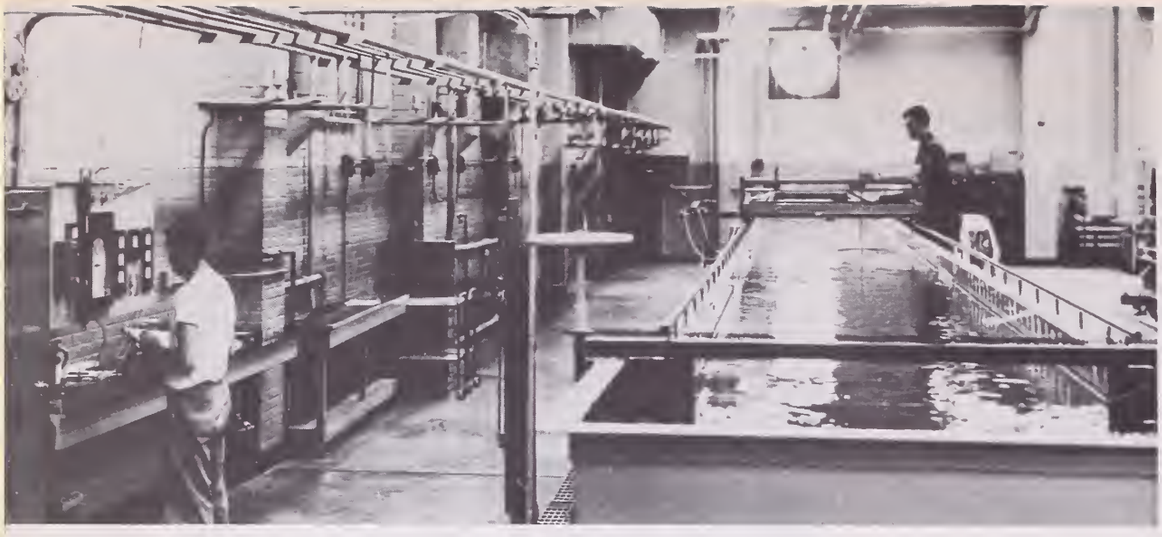
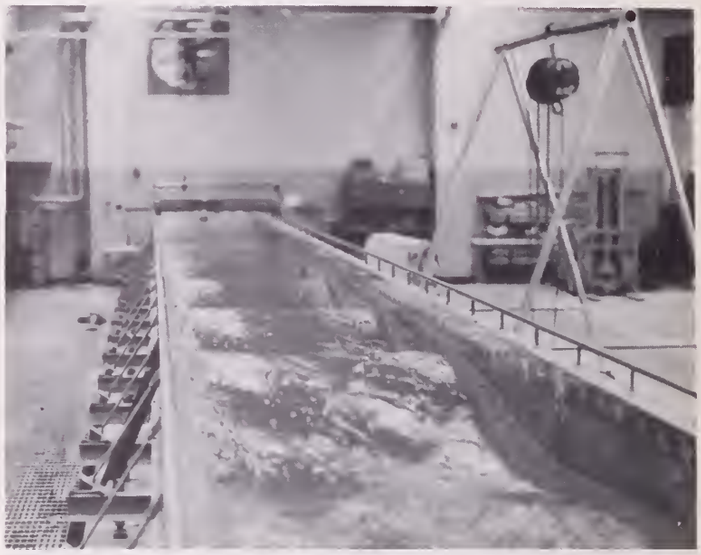


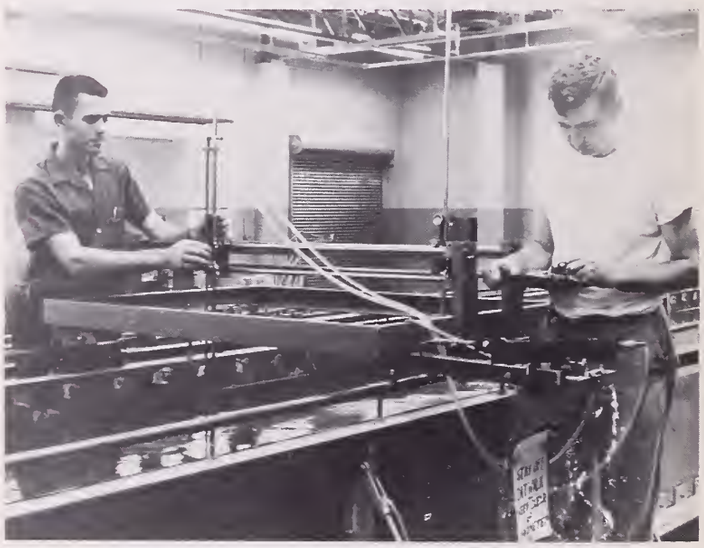
Larger of two model flumes or channels in the hydraulic laboratory, used to study sediment transport under controlled conditions. This one is 100 feet long. Its slope can be regulated to duplicate the slope of local streams. BN-13570X

This standing-wave action is frequently observed in streams near the USDA Sedimentation Laboratory, Oxford, Miss. What causes them and what relation they have on movement of sediment are some of the questions scientists are trying to answer. N-32197



Duplicating the phenomena in the laboratory flume for study under controlled conditions may provide the information. BN-15331X

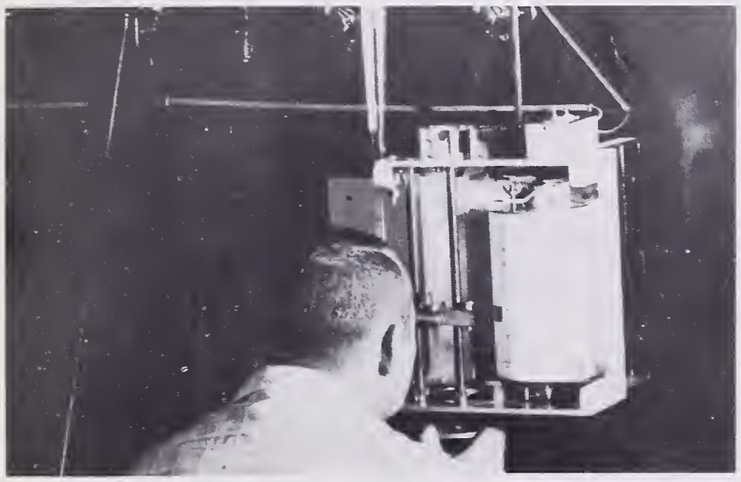
This underwater device called a transducer has two ultrasonic elements which map changing profiles of surface water and sandbed simultaneously. The high frequency sound signals are automatically recorded on a strip recorder. N-38860



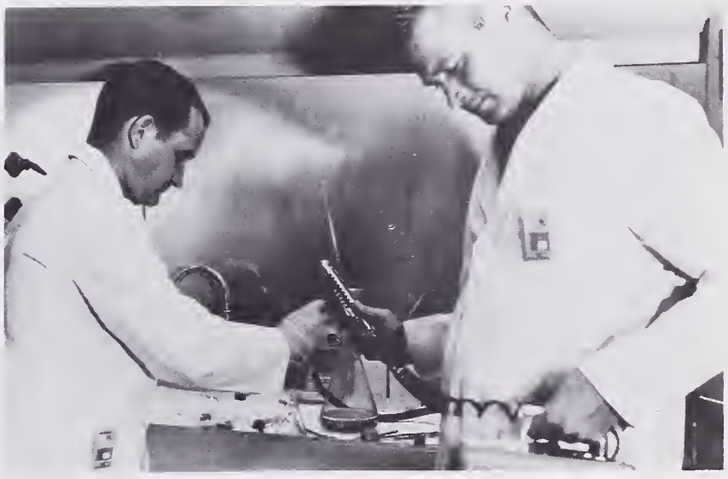
Velocity of water and sediment at various points in the experimental flume is measured using instruments mounted on a specially designed travelling carriage. Here scientists are using a pitot-static tube and an inclined differential manometer for measurements. BN-15333X

Sediment sampling from cableway gaging station. Sample is collected at each of several points across the channel. The water discharge and total sediment loads are determined and the data then related to watershed land use. BN-15347X

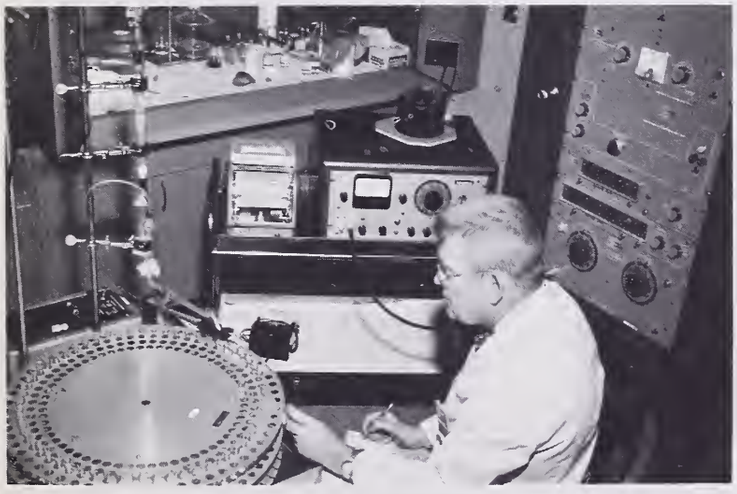
Samples collected from various stations in the area under study are brought to the Sediment Analysis Laboratory. The samples are treated to make solids settle, then water is decanted; the solid material is then dried, weighed and analyzed. BN-15337X



Scientist determines size distribution of suspended sediment particles by visual accumulation tube method. The size is measured and recorded on a revolving drum as particles fall past the eyepiece. BN-15335X



Radioisotope-tagged particles of sand help to trace movement of sediment. Here samples are transferred to planchets to determine the radioactivity present. Such operations are carefully monitored to safeguard the laboratory workers. BN-15336X



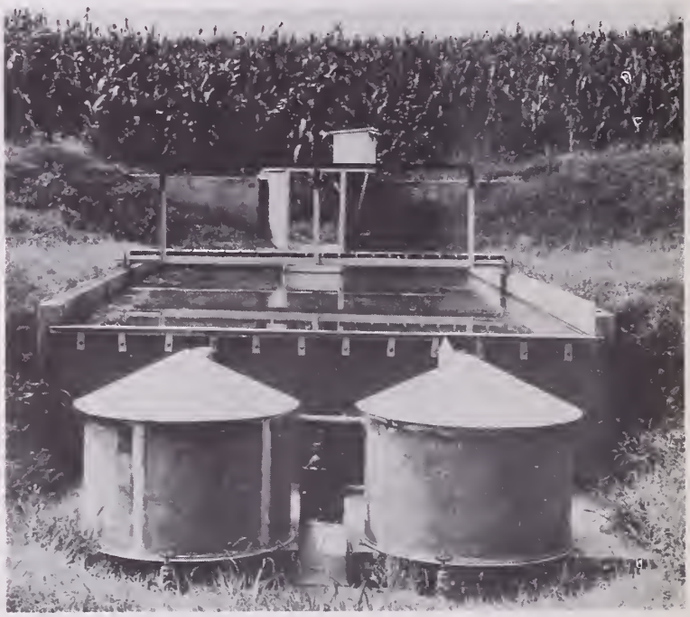
Scientist obtains readings of radioactivity of tagged sediment samples using proportional and scintillation types of radiation detectors. The radioisotope technique will assist in determining how fast and far eroded soils travel. N-38868

Hydrologists use gamma-ray density probe to measure volume weight of sediment accumulation in reservoirs. This is one of the new tools that will help to develop data for better control of sedimentation that robs reservoirs of storage space. BN-13751X

Nuclear and electronic equipment is now used to measure soil density and moisture to determine how these are related to production and deposition of stream sediment. Here a neutron probe is used to measure moisture in watershed soils. BN-13756X

Soil scientists collect samples of soil from the channel bank where it has been undercut during high stream flow. One or two crop rows are lost each year by erosion of the bank of this stream, typical of those about Oxford, Miss. BN-15334X

Special drilling rig has both vacuum and pressure equipment to obtain samples of soil for study of subsurface earth layers and groundwater levels. BN-13759X



This type of installation—a modified Parshall flume—is used for studies of runoff and sediment production from cultivated and pasture fields. It contains a water stage recorder, a "silt box" or sediment basin, slot type sampler tanks. BN-15332X

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Growth Through Agricultural Progress